High School Dropouts in Emerging Adulthood: Substance Use, Mental Health Problems, and Crime

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Abstract This study examined the distribution of substance use, mental health, and criminal behavior among dropouts derived from a nationally representative sample of 18–25 year old (N = 19,312) emerging adults in the United States. Using public-use data from the 2010 National Survey on Drug Use and Health, this study employed multiple logistic regression with adjustments for complex survey sampling and compared high school dropouts with graduates with respect to substance use, mental health, and criminal behavior. After controlling for the effects of age, gender, race/ethnicity, family income, receipt of government assistance, employment status, and metropolitan population density, dropouts were more likely to meet criteria for nicotine dependence and report daily cigarette use, and more likely to report having attempted suicide in the previous year, been arrested for larceny, assault, drug possession or drug sales relative to their high school graduate counterparts. The findings of this study provide important insights and an initial epidemiologic portrait of mental health, substance use, and criminal behaviors of dropouts during emerging adulthood.

Keywords High school dropouts · Emerging adulthood · Mental health · Substance use

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Introduction

The high school dropout problem is a significant public health issue in the United States and has been recently referred to as a crisis (Rumberger 2011). Depending on how and where dropout rates are measured, it is expected that between 9.3 and 43.7 % of freshman will fail to graduate with a regular diploma within 4 years of entering high school (Chapman et al. 2011). Higher rates of dropout are observed for racial minority groups, particularly black and Hispanic students compared to white students, and in school districts characterized by a large proportion of poor and ethnic minority students (Chapman et al. 2011). Prior research has found dropout to be associated with numerous social and behavioral health problems including poorer mental and physical health problems (Vaughn et al. 2014), less positive well-being (Oreopoulos and Salvanes 2011; US Department of Commerce 2009) and greater involvement criminal activity (Lochner and Moretti 2004; U.S. Department of Justice 2004) relative to those who graduate from high school. Moreover, high school dropouts are costly to society, with an estimated lifetime cost close to $240,000 per dropout resulting from lower tax contributions, higher reliance on public assistance, and higher incidence of criminal activity (Chapman et al. 2011; Levin and Belfield 2007; Rouse 2007).

Notwithstanding the extant research of the social, health, and behavioral correlates of high school dropout, systematic empirical research using nationally representative samples has lagged. Moreover, although the problem of high school dropout has been recognized as a public health issue, and dropout reduction is seen as a viable means of curbing health disparities (Freudenberg and Ruglis 2007), there is an overall lack of research that applies epidemiological and public health approaches to the study and intervention of dropout and educational risk. Examining high school

dropout from a combined public health approach could benefit the study of dropout and readily inform policy, practice, and cross-systems collaborations to reduce health disparities exacerbated by dropout and educational risk.

While much insight has been garnered from several notable studies documenting disproportionately higher levels of mental health problems, substance use, and criminal activity of high school dropouts relative to their graduating peers, little research has focused on the behavioral health and criminal activity of dropouts in emerging adulthood. Emerging adulthood is a relatively new conception of development of young adults between the ages of 18–25 that points to developmentally distinct features differentiating emerging adulthood from adolescence and young adulthood (Arnett 2000). Characteristics of emerging adulthood include the experimental and exploratory nature of the period and fewer role constraints, reflected by demographic heterogeneity and residential diversity and unpredictability of this age group. Emerging adulthood is also characterized by a subjective sense of being in-between adolescence and adulthood—neither feeling like an adolescent, who is mostly dependent on others, nor feeling like a self-sufficient person, a key criterion to fully transitioning to an adult (Arnett 2000). Also notable during the period of emerging adulthood is continued identity development focusing on love, work, and worldviews; the peak of several types of risk behaviors, including substance use; and the nature of relationships with parents (i.e. physical and emotional proximity; Arnett 2005).

Despite these developmentally distinctive features of emerging adulthood, dropout researchers have largely ignored this developmental period and have instead focused on the period of adolescence, typically to 18 years of age, or on adults as one developmentally homogeneous group. The dearth of studies of young adults between the ages of 18–25 who are not attending college is due to several factors, notably a lack of access to samples of 18–25 year olds and the relatively new developmental conception of this age group (Arnett 2000). A growing body of research has affirmed emerging adulthood as a distinct developmental period worthy of inquiry. Given the characteristics of emerging adulthood, and the challenges presented by dropping out of school, examining patterns of substance use, mental health, and criminal behavior of emerging adults relative to dropout status is critical to building an empirical and theoretical understanding of both dropout and emerging adulthood.

Purpose of the Present Study

To address these research gaps, the present investigation examines the distribution of substance use, mental health problems, and criminal behavior among dropouts derived from a nationally representative sample of 18–25 year old adults in the United States. Our overarching conceptual framework is derived from a transdisciplinary viewpoint that sees solving complex problems, such as dropout, as moving beyond traditional disciplinary fields and relying more on a multi-level cell to society approach (Juster et al. 2011; Rosenfield 1992; Vaughn et al. 2013). As such, within the present investigation we attempt to build bridges across the public health, education, and criminal justice systems by examining patterns of substance use, mental health, and criminal behavior of dropouts relative to high school graduates with over 19,000 emerging adults. Although we expect dropouts to have greater use of substances, mental health problems, and criminal behaviors compared to high school graduates, the magnitude of these differences is not clear. Moreover, there may well be little differences on some conditions when appropriate adjustments are made with respect to race, gender, income, and employment status. The overall goal is to provide a comprehensive epidemiological statement aimed toward building an evidence-base on dropouts within the developmental context of emerging adulthood.

Methods

Sample and Procedures

This study is based on public-use data from the 2010 National Survey on Drug Use and Health (NSDUH) (SAMHSA 2011). The NSDUH is designed to provide population estimates of substance use and health-related behaviors in the US general population. It utilizes multistage area probability sampling methods to select a representative sample of the US civilian, non-institutionalized population aged 12 years or older for participation in the study. Multistage sampling designs are commonly used when attempting to provide nationally representative estimates. This is because interviewing all participants is not feasible so larger units are the first stage selected from which subsequent levels of strata are partitioned until individuals from households are selected. With respect to the NSDUH, all 50 states and the District of Columbia were employed. Within this state-level stage one sample, secondary sampling units (stage two) were based on regions within states with large states composed of 48 regions and remaining states parsed in 12 regions. Census tracts within these secondary sampling regions were then used to select household or dwelling units and individuals (stage three). Study participants include household residents; residents of shelters, rooming houses, and group homes; residents of Alaska and Hawaii; and civilians residing on military bases. To improve the precision of drug use estimates for subgroups, adolescents aged 12–17 years and emerging adults aged 18–25 years were oversampled.

NSDUH study participants were interviewed in private at their places of residence. Potential participants were assured that their names would not be recorded and that their responses would be kept strictly confidential. Participants were paid thirty dollars for their participation. All field interviewers signed a confidentiality agreement, and the procedures and protections were carefully explained to potential participants in the informed consent protocol. The NSDUH interview utilizes a computer-assisted interviewing (CAI) methodology to increase the likelihood of valid respondent reports of illicit substance use behaviors (SAMHSA 2011). The CAI methodology includes a combination of computer-assisted personal interviewing (CAPI) and audio computer-assisted self-interviewing (ACASI) methodologies. ACASI is designed to provide the respondent with a highly private and confidential means of responding to questions and is used for questions of a sensitive nature (e.g., substance use, antisocial behavior, arrest history, etc.). Respondents read questions on the computer screen or questions were read to respondents through headphones, and then respondents entered their responses directly into the computer.

A total of 68,487 respondents aged 12 years or older completed the 2010 survey. Weighted response rates were 88.8 % for household screening and 74.7 % for interviewing (SAMHSA 2011). Each independent, cross-sectional NSDUH sample was considered representative of the US general population aged 12 years or older. NSDUH design and data collection procedures have been reported in greater detail elsewhere (SAMHSA 2011). The current study restricted analyses to emerging adults aged 18–25 years (N = 19,312). The mean age of the sample is 20.9 years old (SD = 1.76). The respondents were evenly distributed between males (51.0 %) and females (49.0 %), but are unevenly distributed in terms of race/ethnicity. More than half of the respondents are White (59.6 %), 19.3 % are Hispanic, and 14.3 % are African-American. The annual family income of 32.0 % of the sample is less than $20,000; 33.4 % have income between $20,000 and $49,999; 14.3 % have income between $50,000 and $74,999; and 20.3 % have more than $75,000 annual family income. Given that the NSDUH no longer oversamples targeted racial and ethnic demographic subgroups, the characteristics of the sample are roughly equivalent to other recent estimates of the young people in the general population (National Adolescent Health Information Center 2008; SAMHSA 2011).

Measures

High School Dropout

Respondents were queried as to their highest level of educational attainment and their current status as students.

Respondents who had not completed high school and who were not currently enrolled in school were considered to be high school dropouts (N = 2,105, 9.92 %). This estimate is consistent with the 2009 national status dropout rate of 8.1 % of US noninstitutionalized civilian 16–24 year olds who are not in school and have not earned a high school diploma or alternative credential (Chapman et al. 2011). The dropout group was contrasted with other emerging adults (ages 18–25) who had completed their high school education to form the reference group for study analyses.

Substance Use and Chemical Dependency

Six measures of substance use were examined in this study. Specifically, substance use items assessed use of cigarettes (i.e. daily use), alcohol (i.e. more than 5 drinks on the same occasion), marijuana, cocaine/crack, opiates, and methamphetamine. Respondents who had used any of these substances were identified by responding to questions about the frequency of use of each of the aforementioned substances during the previous 12 months. Sample items included, "On how many days in the past 12 months did you use marijuana or hashish?" and "On how many days in the past 12 months did you have more than 5 drinks on the same occasion?" With the exception of daily cigarette use (1 = daily use, 0 = no use/less than daily use), emerging adults who responded that they had not used a particular substance on any days were coded as 0 while respondents who reported one or more instances of use were coded as 1.

In addition to substance use, three measures of chemical dependency were also examined: nicotine, alcohol, and marijuana dependence. Nicotine dependence was determined on the basis of the Nicotine Dependence Syndrome Scale (NDSS; Shiffman et al. 2004) and the Fagerstrom Test of Nicotine Dependence (FTND; Fagerstrom 1978; Heatherton et al. 1991). Respondents who met criteria for nicotine dependence for either measure were identified as nicotine dependent and coded as 1 while all other respondents were coded as 0. Alcohol and marijuana dependence were determined based on the criteria of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*, 4th edition (American Psychiatric Association [APA] 1994). Respondents who met DSM criteria for alcohol or marijuana dependence were coded as 1 and all other respondents coded as 0. Further information as to the precise operationalization of these three variables is provided in greater detail elsewhere (SAMHSA 2011).

Mental Health

The three categories of mental health severity utilized in this study (i.e. mild, moderate, and serious mental illness) were constructed by NSDUH researchers based on

modeling participant responses to questions relating to psychological distress and functional impairment (SAM-HSA 2011) *Psychological distress* was measured on the basis of the Kessler-6 (Furukawa et al. 2003; Kessler et al. 2003). *Functional impairment* was measured using a truncated adaptation of the WHODAS-II specifically designed to measure the degree to which individuals encountered difficulty in performing daily activities as a function of emotional, nervous, or mental health problems "the level of difficulty in performing daily activities due to problems with emotions, nerves, or mental health" (Novak et al. 2010; Rehm et al. 1999). Using these two measures, the NSDUH developed the three indicators: mild (N = 3,142, 16.3 %), moderate (N = 1,219, 6.3 %), and serious mental illness (N = 1,558, 8.1 %). These estimates are consistent with studies suggesting that more than one in four (26.2 %) American adults meet criteria for a diagnosable mental disorder in a given year (Kessler et al. 2005). This was done by means of complex statistical modeling and was validated in conjunction with clinical interviews that utilized the Structured Clinical Interview for DSM-IV-TR Axis I Disorder Non-Patient Edition (SCID). Further information on the precise operationalization of these items is available elsewhere (SAMHSA 2011).

Respondents who reported that they had received mental health treatment during the past year were also identified. Respondents who reported that they had received such treatment (N = 2,280, 11.0 %) were coded as 1 and all other respondents coded as 0. Additionally, three measures relating to emerging adult suicidality were also assessed: suicidal ideation, suicidal planning, and suicide attempts. Respondents who reported having recently thought about committing suicide (N = 1,330, 6.9 %), had planed how to commit suicide (N = 411, 2.1 %), or had attempted suicide (N = 251, 1.1 %) were coded as 1 and all other respondents coded as 0.

Criminal Behavior

Four measures of recent arrest history were also examined. These included arrests for driving under the influence of alcohol (DUI), larceny, assault, and drug possession/sales. Respondents who had been arrested were identified by responding to questions about having been arrested for any of the aforementioned behaviors during the previous 12 month period. For example, respondents who had been arrested for assault (N = 209, 1.11 %) responded affirmatively to the question, "In the last 12 months, were you arrested and booked for assault, such as simple assault or battery?" For each of these items, respondents who reported having been arrested for these offenses were coded as 1 and all other respondents coded as 0.

Sociodemographic Variables

The following demographic variables were used: Age, gender, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and other [American Indian or Alaska Native, Asian, other Pacific Islander or Native Hawaiian, and persons reporting more than one race]), total annual family income (less than $20,000, $20,000 to $49,999, $50,000 to $74,999, and $75,000 or more), receipt of government social welfare assistance (food stamps, supplemental security income, cash assistance), employment status (employed full-time, part-time, unemployed, and persons not seeking employment), and metropolitan population density (classified as large metropolitan area, greater than 1 million; small metropolitan area, less than 1 million; and nonmetropolitan). Family income was ascertained by asking respondents: "of these income groups, which category best represents your total combined family income during the previous calendar year?"

Statistical Analysis

For all statistical analyses, weighted prevalence estimates and standard errors were computed using Stata 13.1SE (StataCorp. 2013). This system implements a Taylor series linearization to adjust standard errors of estimates for complex survey sampling design effects including clustered data.

Four sets of multiple logistic regression analyses were conducted that compared emerging adult high school dropouts with emerging adult high school graduates. The first multivariate analyses assessed the associations between sociodemographic variables and high school dropout status. Subsequently, we examined the associations between substance use, chemical dependency, and high school dropouts status. Third, the associations between antisocial behaviors, recent arrest history, and school dropout status was examined. Finally, the associations between psychiatric distress, receipt of psychiatric treatment, suicidality, and school dropout status were examined. Final adjusted models control for the effects of age, gender, race/ethnicity, family income, receipt of government assistance, employment status, and metropolitan population density. Adjusted odds ratios (AORs) and 95 % confidence intervals are presented to reflect the strength of the association between the aforementioned variables. AORs were considered to be statistically significant if the associated confidence intervals did not cross the 1.0 threshold.

Results

Data presented in Tables 1, 2, 3 and 4 display the row percentages of high school dropouts and non-dropouts for each

Table 1 Socio-demographic associations with school dropout status among young adults ages 18–25 in the United States

	Dropped out of high school				Unadjusted		Adjusted	
	No (N = 17,199)		Yes (N = 2,105)					
	N (%)	95 % CI	N (%)	95 % CI	OR	(95 % CI)	OR	(95 % CI)
Age								
18–21 years	9,055 (90.83)	(90.0–91.6)	1,002 (9.17)	(8.4–10.0)	1.00		1.00	
22–25 years	8,144 (89.26)	(88.4–90.1)	1,103 (10.74)	(9.9–11.6)	**1.19**	**(1.05–1.35)**	1.13	(0.98–1.31)
Gender								
Female	9,062 (91.70)	(91.0–92.4)	966 (8.30)	(7.6–9.0)	1.00		1.00	
Male	8,137 (88.51)	(87.6–89.4)	1,139 (11.49)	(10.6–12.4)	**1.43**	**(1.27–1.62)**	**1.63**	**(1.42–1.86)**
Race/Ethnicity								
White	10,735 (92.90)	(92.3–93.5)	917 (7.10)	(6.5–7.7)	1.00		1.00	
Hispanic	2,235 (80.54)	(78.7–82.3)	306 (19.46)	(17.7–21.3)	**3.16**	**(2.73–3.66)**	**2.79**	**(2.38–3.27)**
African–American	2,638 (89.17)	(87.5–90.7)	700 (10.83)	(9.3–12.5)	**1.59**	**(1.32–1.92)**	0.98	(0.79–1.20)
Other	1,591 (94.30)	(92.6–95.6)	182 (5.70)	(4.4–7.4)	0.79	(0.59–1.06)	0.76	(0.56–1.03)
Family Income								
<$20,000	5,749 (86.75)	(85.6–87.8)	965 (13.25)	(12.2–14.4)	1.00		1.00	
$20,000–$49,000	5,715 (87.80)	(86.7–88.8)	867 (12.20)	(11.2–13.3)	0.91	(0.79–1.04)	**0.85**	**(0.73–0.98)**
$50,000–74,999	2,499 (94.21)	(92.8–95.3)	145 (5.79)	(4.7–7.2)	**0.40**	**(0.31–0.51)**	**0.46**	**(0.36–0.60)**
>$75,000	3,236 (96.16)	(95.1–97.0)	128 (3.84)	(3.0–4.9)	**0.26**	**(0.20–0.34)**	**0.36**	**(0.28–0.48)**
Government Aid								
No	13,634 (93.20)	(92.6–93.7)	1,057 (6.80)	(6.3–7.4)	1.00		1.00	
Yes	3,565 (79.16)	(77.5–80.7)	1,048 (20.84)	(19.3–22.5)	**3.61**	**(3.17–4.10)**	**3.08**	**(2.66–3.58)**
Employment Status								
Unemployed	2,064 (83.48)	(81.5–85.3)	483 (16.52)	(14.7–18.5)	1.00		1.00	1.00
Employed (Full Time)	6,222 (88.84)	(87.8–89.8)	790 (11.16)	(10.2–12.2)	**0.63**	**(0.53–0.75)**	**0.80**	**(0.66–0.97)**
Employed (Part Time)	4,998 (95.17)	(94.4–95.8)	303 (4.83)	(4.2–5.6)	**0.26**	**(0.21–0.32)**	**0.35**	**(0.28–0.44)**
Other	3,915 (89.64)	(88.4–90.8)	529 (10.36)	(9.2–11.6)	**0.58**	**(0.48–0.71)**	**0.66**	**(0.54–0.82)**
County								
Large metro	7,412 (90.55)	(89.7–91.3)	890 (9.45)	(8.7–10.3)	1.00		1.00	
Small metro	6,368 (90.88)	(89.9–91.7)	695 (9.12)	(8.3–10.0)	0.96	(0.83–1.11)	0.95	(0.81–1.11)
Non-metro	3,419 (86.47)	(84.9–87.5)	520 (13.53)	(12.1–15.1)	**1.50**	**(1.28–1.76)**	**1.58**	**(1.33–1.89)**

Adjusted odds ratios adjusted for age, gender, race/ethnicity, income, receipt of government aid, employment status, and county population density. The category "other" under employment status includes individuals who are disabled, retired, school/training, or not looking currently pursuing employment

Odds ratios and confidence intervals in bold are statistically significant ($p < .05$)

variable followed by unadjusted and adjusted odds ratios. The unadjusted odds ratios do not control for the effects of age, gender, race/ethnicity, family income, receipt of government assistance, employment status, and metropolitan population density; the adjusted odds ratios control for all of these factors. This manner of presenting the data is an efficient and common approach in epidemiological studies designed to present data for an extensive array of categorical variables.

Sociodemographic Correlates

Table 1 presents the results of multiple logistic regression models examining the associations between a variety of

sociodemographic factors and high school dropout status. In terms of gender, high school dropouts were significantly more likely to be male (AOR 1.63, 95 % CI 1.42–1.86). Along the lines of race/ethnicity, high school dropouts were also significantly more likely to be Hispanic (AOR 2.79, 95 % CI 2.38–3.27). Compared to high school graduates, high school dropouts were significantly less likely to report family income levels above $20,000 per year. As such, it follows that high school dropouts were also significantly more likely to report the receipt of government aid such as food stamps or cash assistance (AOR 3.08, 95 % CI 2.66–3.58). With respect to employment status, high school dropouts were significantly less likely to

Table 2 Substance use associations with school dropout status among young adults ages 18–25 in the United States

	Dropped out of high school				Unadjusted		Adjusted	
	No (N = 17,199)		Yes (N = 2,105)					
	N (%)	95 % CI	N (%)	95 % CI	OR	(95 % CI)	OR	(95 % CI)
Substance use								
Tobacco (Daily)								
No	14,587 (92.19)	(91.8–93.3)	1,340 (7.81)	(6.7–8.2)	1.00		1.00	
Yes	2,550 (79.18)	(86.8–88.5)	749 (20.82)	(11.5–13.2)	**2.71**	**(2.20–2.33)**	**2.67**	**(2.14–3.33)**
Alcohol (Binge)								
No	10,096 (89.40)	(88.6–90.1)	1,298 (10.60)	(9.9–11.4)	1.00		1.00	
Yes	7,103 (91.05)	(90.2–91.8)	807 (8.94)	(8.2–9.8)	**0.68**	**(0.59–0.79)**	**0.66**	**(0.56–0.78)**
Marijuana								
No	12,074 (90.30)	(89.6–90.9)	1,415 (9.70)	(9.1–10.4)	1.00		1.00	
Yes	5,125 (89.57)	(89.5–90.6)	690 (10.43)	(9.4–11.5)	0.90	(0.76–1.06)	1.03	(0.72–1.45)
Cocaine/Crack								
No	16,479 (90.27)	(89.7–90.8)	1,966 (9.73)	(9.2–10.3)	1.00		1.00	
Yes	720 (86.26)	(83.0–89.0)	139 (13.74)	(11.0–13.7)	1.14	(0.83–1.57)	1.02	(0.72–1.45)
Opiates								
No	16,794 (90.18)	(89.6–90.7)	2,024 (9.82)	(9.3–10.4)	1.00		1.00	
Yes	405 (86.38)	(82.1–89.8)	81 (13.62)	(10.2–17.9)	0.89	(0.62–1.27)	1.07	(0.72–1.60)
Methamphetamine								
No	17,103 (90.14)	(89.6–90.7)	2,077 (9.86)	(9.3–10.4)	1.00		1.00	
Yes	96 (81.02)	(71.6–87.9)	28 (18.98)	(12.1–28.4)	1.62	(0.92–2.86)	1.60	(0.83–3.06)
Chemical dependency								
Nicotine								
No	15,535 (91.46)	(90.9–92.0)	1,574 (8.54)	(8.0–9.1)	1.00		1.00	
Yes	1,664 (78.16)	(75.8–80.3)	531 (21.84)	(16.7–24.2)	**1.44**	**(1.14–1.82)**	**1.52**	**(1.20–1.94)**
Alcohol								
No	16,113 (90.13)	(89.5–90.7)	1,945 (9.87)	(9.3–10.5)	1.00		1.00	
Yes	1,086 (89.43)	(86.9–91.5)	160 (10.57)	(8.5–13.1)	1.04	(0.78–1.38)	1.02	(0.75–1.39)
Marijuana								
No	16,635 (90.23)	(89.6–90.8)	1,995 (9.77)	(9.2–10.4)	1.00		1.00	
Yes	564 (86.30)	(82.7–89.2)	110 (13.70)	(10.8–17.2)	**1.39**	**(1.02–1.91)**	1.20	(0.85–1.70)

Adjusted odds ratios adjusted for age, gender, race/ethnicity, income, receipt of government aid, employment status, county population density, and all substance use/chemical dependency variables

Odds ratios and confidence intervals in bold are statistically significant ($p < .05$)

be employed full (AOR 0.80, 95 % CI 0.66–0.97) or part-time (AOR 0.35, 95 % CI 0.28–0.44) and to report being outside the labor market for reasons such as school/training or disability (AOR 0.58, 95 % CI 0.54–0.82). Finally, in terms of metropolitan population density, high school dropouts were significantly more likely than high school graduates to report residing in a nonmetropolitan area (AOR 1.58, 95 % CI 1.33–1.89).

Substance Use and Chemical Dependency

Table 2 examines the associations between the use of drugs and alcohol and diagnoses of chemical dependency among high school dropouts compared to high school graduates. In terms of the use of drugs and alcohol, high school dropouts were significantly more likely to report daily cigarette use (AOR 2.67, 95 % CI 2.14–3.33) and less likely to report binge alcohol use (AOR 0.66, 95 % CI 0.56–0.78) during the previous 12 months. No significant differences were identified in terms of the use of marijuana, cocaine/crack, opiates, or methamphetamine. In terms of chemical dependency, high school dropouts were significantly more likely to receive a diagnosis of nicotine dependence (AOR 1.52, 95 % CI 1.20–1.94). No significant associations were identified in terms of alcohol or marijuana dependence.

Table 3 Mental Health and suicidal associations with school dropout status among young adults ages 18–25 in the United States

	Dropped out of high school				Unadjusted		Adjusted	
	No (N = 17,199)		Yes (N = 2,105)					
	N (%)	95 % CI	Row %	95 % CI	OR	(95 % CI)	OR	(95 % CI)
Psychiatric distress								
Mild								
No	11,919 (90.02)	(89.3–90.7)	1,460 (9.98)	(9.4–10.7)	1.00		1.00	
Yes	2,812 (90.26)	(88.7–91.6)	329 (9.74)	(8.4–11.2)	0.94	(0.79–1.13)	1.00	(0.82–1.23)
Moderate								
No	11,919 (90.02)	(89.3–90.7)	1,460 (9.98)	(9.3–10.7)	1.00		1.00	
Yes	1,076 (88.33)	(85.5–90.7)	143 (11.67)	(9.3–14.5)	1.13	(0.84–1.51)	1.17	(0.85–1.61)
Serious								
No	11,919 (90.02)	(89.4–90.7)	1,460 (9.98)	(9.3–10.7)	1.00		1.00	
Yes	1,385 (90.16)	(88.6–91.5)	173 (8.40)	(6.9–10.1)	0.81	(0.61–1.09)	0.82	(0.60–1.14)
Psychiatric treatment								
Therapy								
No	15,096 (90.12)	(89.5–90.7)	1,846 (9.88)	(9.3–10.5)	1.00		1.00	
Yes	2,043 (90.61)	(88.9–92.1)	237 (9.39)	(7.9–11.1)	0.90	(0.72–1.13)	1.00	(0.79–1.25)
Suicidality								
Suicidal ideation								
No	15,992 (90.32)	(89.7–90.9)	1,905 (9.68)	(9.1–10.3)	1.00		1.00	
Yes	1,147 (87.71)	(85.1–89.9)	183 (12.29)	(10.1–14.9)	1.11	(0.79–1.56)	1.05	(0.73–1.50)
Suicidal planning								
No	16,798 (90.29)	(89.7–90.8)	2,016 (9.71)	(9.2–10.3)	1.00		1.00	
Yes	340 (83.24)	(77.7–87.6)	71 (16.76)	(12.3–22.3)	1.22	(0.73–2.07)	1.11	(0.61–2.01)
Suicide attempt								
No	16,943 (90.29)	(89.7–90.8)	2,032 (9.71)	(9.2–10.3)	1.00		1.00	
Yes	195 (77.11)	(69.0–83.6)	56 (22.89)	(16.4–31.0)	**2.49**	**(1.42–4.35)**	**2.05**	**(1.09–3.88)**

Adjusted odds ratios adjusted for age, gender, race/ethnicity, income, receipt of government aid, employment status, county population density, psychiatric treatment, and all suicidality variables

Odds ratios and confidence intervals in bold are statistically significant ($p < .05$)

Mental Health

Table 3 presents the associations between mental health status, receipt of mental health treatment, and suicidality among high school dropouts compared to high school graduates. In terms of mental health status, no significant associations were identified in terms of mild, moderate, or serious mental illness, or in terms of the differential likelihood of high school dropouts and high school graduates to pursue mental health therapy. In terms of suicidality, no significant associations were identified in terms of suicidal ideation or suicidal planning; however, compared to high school graduates, high school dropouts were significantly more likely to report having recently attempted to commit suicide (AOR 2.05, 95 % CI 1.09–3.88).

Criminal Behavior

Table 4 compares the prevalence of recent arrest history among high school dropouts and high school graduates. High school dropouts were significantly more likely to report having been arrested for larceny (AOR 2.11, 95 % CI 1.20–3.71), assault (AOR 3.37, 95 % CI 2.0 for-5.55), and drug possession or drug sales (AOR 2.13, 95 % CI 1.37–3.32). No significant association was identified in terms of having recently been arrested for driving under the influence.

Discussion

Guided by a transdisciplinary lens, the present study examined the distribution of substance use, mental health,

Table 4 Criminal Behavior associations with school dropout status among young adults ages 18–25 in the United States

	Dropped out of high school				Unadjusted		Adjusted	
	No (N = 17,199)		Yes (N = 2,105)					
	Row %	95 % CI	Row %	95 % CI	OR	(95 % CI)	OR	(95 % CI)
Recent Arrest History								
D.U.I.								
No	16,677 (90.46)	(89.9–91.0)	1,943 (9.54)	(9.0–10.1)	1.00		1.00	
Yes	216 (85.37)	(78.6–90.3)	43 (14.63)	(9.7–21.4)	1.23	(0.74–2.07)	1.09	(0.63–1.90)
Larceny								
No	16,761 (90.50)	(89.9–91.0)	1,945 (9.50)	(8.9–10.1)	1.00		1.00	
Yes	133 (77.29)	(68.6–84.1)	41 (22.71)	(15.9–31.4)	**2.13**	**(1.30–3.47)**	**1.98**	**(1.15–3.39)**
Assault								
No	16,748 (90.66)	(90.1–91.2)	1,922 (9.34)	(8.8–9.9)	1.00		1.00	
Yes	145 (66.86)	(57.2–75.2)	64 (33.14)	(24.7–42.8)	**4.11**	**(2.69–6.27)**	**3.32**	**(2.04–5.41)**
Drug Possession/Sale								
No	16,717 (90.61)	(90.0–91.1)	1,916 (9.40)	(8.8–10.0)	1.00		1.00	
Yes	178 (76.51)	(69.2–82.5)	70 (23.49)	(17.5–30.8)	**2.42**	**(1.66–3.54)**	**2.12**	**(1.38–3.25)**

Adjusted odds ratios adjusted for age, gender, race/ethnicity, income, receipt of government aid, employment status, county population density, and recent arrest history

Odds ratios and confidence intervals in bold are statistically significant ($p < .05$)

and criminal behavior among high school dropouts in emerging adulthood derived from a large, nationally representative sample. This effort sought to further bridge the public health, education, and criminal justice fields to promote needed interdisciplinary efforts to curb the dropout crisis. Findings of the present study confirm the high prevalence of high school dropout in a nationally representative sample. Of the 19,312 emerging adults in this sample, 10 % had dropped out of high school. The estimated cost of the dropouts in this sample alone, assuming a cost per dropout of $240,000 (Levin and Belfield 2007), amounts to over $500 million in economic losses over the life span of the study respondents.

Consistent with prior research, dropouts are more likely to be male and minority and report lower income, greater reliance on government aid, and less likely to be employed than high school graduates (Chapman et al. 2011; Rouse 2007). Study findings also show that dropouts, in relation to high school graduates, are more likely to report daily cigarette use and nicotine dependence, but not more likely to use illicit substances than graduates. As previously discussed, a notable characteristic of emerging adulthood is higher prevalence of drug use and abuse compared to other developmental periods (Arnett 2005). So, while substance use is more prevalent among this age group overall, this study confirms that the likelihood of using nicotine is even greater among dropouts during this developmental period. Notably, however, dropouts are significantly less likely to report binge alcohol use

compared to high school graduates. This finding may be influenced by the tendency of college-enrolled youth to use alcohol at higher rates than their non-college attending counterparts (Slutske et al. 2004). In terms of mental health, dropouts were two times more likely to report attempting suicide than their counterparts who graduated from high school. While the relationship between physical health and education is beginning to be elucidated (Rumberger 2011), the present study indicates that dropouts are also more likely to experience adverse behavioral health conditions during a developmental period where mental health care is underutilized due to a number of perceived barriers (Gulliver et al. 2010; Hunt and Eisenberg 2010; Rickwood et al. 2005).

The current study also found a strong pattern of associations between criminal behavior among dropouts. Dropouts during the emerging adult years are a significantly more at-risk group relative to high school graduates. Dropouts were found to be two to three times more likely to have been arrested for larceny, assault, and drug possession or sales than their high school graduate counterparts, even after making appropriate adjustments with respect to race, gender, income, and employment status.

This study employed an epidemiologic approach as a basis to advance an evidence-informed and public health inspired educational approach to dropout. Given the physical and behavioral health and criminal justice implications of educational attainment, a public health approach is warranted (Freudenberg and Ruglis 2007; Vaughn et al. 2012).

Unfortunately, the implementation of a public health approach to dropout has not been fully realized. While numerous efforts are being made to address the dropout crisis, much of the efforts are derived from educational models rather than community or public health models. For example, dropout is a national priority of the Obama administration; however, the efforts have been targeted at educational reform rather than reframing dropout as a public health priority and mobilizing public health resources and methods.

Implementing a public health approach to dropout requires a transdisciplinary collaborative approach to understanding dropout and related risk behaviors as well as developing and testing interventions using the knowledge and methods from education, mental health, criminology, social science, public health, and epidemiology. While there have been a number of mental health and public health interventions targeting educational risk that have been implemented in school settings with potential to positively impact the school dropout crisis, these interventions are rarely scaled up and the impact on school dropout has not been adequately assessed (Freudenberg and Ruglis 2007). In addition to employing interventions aimed at improving the health and behavioral health of students to reduce dropout, a public health model approach to dropout would aim to prevent and minimize immediate and long-term adverse affects of dropout by identifying and targeting risk factors across the service continuum and focusing on the social determinants and the collective well-being of populations.

Using a cell to society informed public health model, prevention and intervention responses are defined in terms of the degree of risk for the problem (Gordon 1983). Interventions aimed to prevent the problem from manifesting are primary (or universal) prevention programs. These programs are delivered to the whole of the population regardless of risk. For dropout, whole school programs delivered to all students at a school regardless of risk, public service announcements, and recreation and community education programs targeting the entire community in promoting overall health and well-being would be considered universal prevention programs. Interventions aimed at those who exhibit risk factors for the targeted problem, or secondary (selective) interventions, target specific risk factors aimed at reducing the likelihood of the problem from developing with those who are most at-risk. For dropout, secondary prevention interventions target students who are exhibiting risk behaviors linked to dropout, such as poor achievement, absenteeism, and low school engagement (Rumberger and Lim 2008). While many, if not most, secondary dropout prevention programs are delivered in the school setting, community-based efforts, such as substance use counseling, teen pregnancy and parenting programs, and community-based programs targeting socio-

emotional problems and violence are examples of secondary prevention programs that can prevent dropout among at-risk youth (Wilson et al. 2011). The third level of intervention, tertiary (indicated) interventions, targets those who are already exhibiting the problem. These interventions would target youth/young adults who have dropped out of school designed to minimize adverse consequences of dropping out, such as dropout recovery programs, may include GED preparation, job skill training, case management, substance use, mental health and health care services to mitigate negative outcomes associated with dropout. Although schools have begun to adopt a tiered approach similar to the public health model for academic interventions (i.e. reading and math deficiencies), the public health model has not been widely adopted in schools for non-academic issues (i.e., socio-emotional-behavioral problems; Freudenberg and Ruglis 2007).

While a number of interventions are being implemented and policy measures have been taken to address the dropout crisis, much of the work is being employed within education policy and directed at education and school curricula concerns, thereby missing important opportunities to address the myriad of non-academic issues that act and interact to increase the risk of dropout and perpetuate academic and health disparities. Adding dropout to the public health policy agenda and adopting a public health model for preventing, identifying, and minimizing risk and adverse consequences of dropout could be a beneficial and cost-effective approach to reduce dropout, improve graduation rates, and ultimately reduce health disparities.

Limitations and Conclusions

Although the size, scope, and long-term stability of the NSDUH are impressive, there are important limitations that should bear caution. First and foremost, study data were cross-sectional and prevented not only an assessment of the temporal relationships between variables, but also a temporal look at the unfolding of dropout and risk behavior. The cross-sectional nature of the data precludes any causal conclusions being inferred from this study. Second, the NSDUH relies on respondent recall and is therefore subject to over- and under-reporting. This can potentially limit the validity of measures influenced by social desirability biases (Holden 2010) such as participation in externalizing behaviors. Finally, although the NSDUH is a nationally representative sample and broad in scope, it does not include potentially important contextual, situational, precipitating, or biological variables, which are necessary to more fully illuminate the relationship between dropout and risk behaviors. Future complimentary studies capable of assessing contextual and situational risk of identified correlates are a natural extension of the present investigation.

Despite these limitations, the results of the present study provide important insights and an initial epidemiologic portrait of the behavioral health and criminal behaviors of dropouts during emerging adulthood. Education is a major social issue that touches intimately on issues of health and behavioral health disparities and as such it is important to forge ties between epidemiology, public health and education in ways that can ameliorate the manifold consequences of dropout.

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